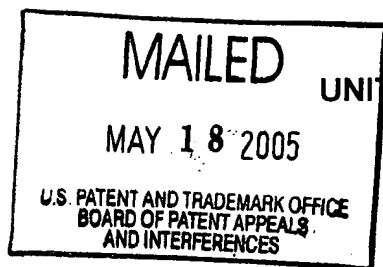


The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

***Ex parte* HEINRICH HENNHOFER, THOMAS BUSCHHARDT,
FRANZ MANGS and GERLINDE WENSAUER**

Appeal No. 2005-1086
Application No. 09/032,305

ON BRIEF

Before PAK, OWENS, and JEFFREY T. SMITH, ***Administrative Patent Judges.***
PAK, ***Administrative Patent Judge.***

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 6, 7 and 9 through 20, which are all of the claims pending in the present application.

APPEALED SUBJECT MATTER

The subject matter on appeal is directed to a process for treating a polished semiconductor wafer with an aqueous treatment solution to oxidize a polished surface of

the semiconductor wafer immediately after the semiconductor wafer has been polished.

See the specification, page 1, in conjunction with claim 14¹. Details of the appealed subject matter are recited in representative claim 14 which is reproduced below:

14. Process for treating a semiconductor wafer, comprising polishing the semiconductor wafer;

immediately after polishing the semiconductor wafer removing the semiconductor wafer from a polishing plate;

immediately after removing the semiconductor wafer from the polishing plate, bringing the semiconductor wafer into contact with an aqueous treatment agent solution for oxidizing a polished surface of the semiconductor wafer by action of the aqueous treatment agent solution,

the wafer being brought into contact with the aqueous treatment agent solution in a manner which is selected from the group consisting of (a) spraying the semiconductor wafer with the aqueous treatment agent solution, (b) dipping the semiconductor wafer into the aqueous treatment agent solution and (c) applying the aqueous treatment solution to the polished surface of the semiconductor wafer by means of a cloth which has been moistened with the aqueous treatment agent solution; and

cleaning the semiconductor wafer.

By virtue of using the transitional term "comprising," in claim 1 on appeal, the appellants permit the inclusion of steps, elements and materials other than those claimed.

In re Baxter, 656 F.2d 679, 686-87, 210 USPQ 795, 802-03 (CCPA 1981)("As long as one of the monomers in the reaction is propylene, any other monomer may be present,

¹ Appellants stipulate that "[a]ll of the claims, on appeal, stand or fall together." See the Brief, page 6. Therefore, for purposes of this appeal, we select claim 14 as representative of all the claims on appeal and decide the propriety of the examiner's rejection below based on this claim alone consistent with 37 CFR § 1.192(c)(7)(2003) and 37 CFR § 41.37(c)(1)(vii) (2004).

because the term 'comprises' permits the inclusion of other steps, elements, or materials.")

PRIOR ART REFERENCES

As evidence of unpatentability, the examiner relies on the following prior art references:

Lampert et al. (Lampert)	4,692,223	Sep. 8, 1987
Fabry et al. (Fabry)	5,219,613	Jun. 15, 1993
Hayashida et al. (Hayashida)	5,580,846	Dec. 3, 1996

THE REJECTIONS

Claims 6, 7 and 9 through 20 stand rejected under 35 U.S.C. § 103 as unpatentable over the combined disclosure of Fabry, Lampert and Hayashida.

OPINION

We have carefully reviewed the claims, specification and applied prior art, including all of the arguments and evidence advanced by both the examiner and the appellants in support of their respective positions. This review has led us to conclude that the examiner's rejection is well founded. Accordingly, we affirm the examiner's rejection for essentially those reasons set forth in the Answer and below.

The appellants argue (the Brief, page 7) that:

The *Fabry* U.S. Patent in column 5 in Example 1 in lines 59 to 63 discloses that subsequent to the polishing step, the wafers were first freed of polishing residues, and then subjected to an oxidative cleaning. Thus, there is an additional step of freeing from polishing residues in *Fabry*, and not the claimed step of immediately oxidizing after removing the wafers from the polishing plate.

We do not agree.

We find that Fabry specifically teaches (Example 1, column 5, line 59 to column 6, line 6) that:

Subsequent to a two-sided polishing carried out in the standard manner, a hundred and fifty silicon wafers (diameter approximately 150 mm (100) orientation) were first freed of polishing residues and then subjected to an oxidative cleaning composed of two substeps in which a one-minute treatment with approximately 0.6% by weight aqueous hydrofluoric acid was followed by a ten-minute treatment in ammoniacal hydrogen peroxide solution. These two substeps consequently corresponded essentially to those of the so-called "RCA cleaning." After final rinsing and drying, the wafers had oxidized polished surfaces which had hydrophilic properties. A water drop (drop volume approximately 10 μ l) applied for the purpose of testing to the center of a wafer drained off completely and consequently revealed the strongly hydrophilic nature of the surface.

According to Hayashida (column 1, lines 33-45), the "RCA cleaning" method referred to in Fabry includes initially removing residues from a wafer with an aqueous oxidative cleaning solution² (a solution containing ammonia, hydrogen peroxide and water) before subjecting the wafer to the two additional oxidative cleaning steps specifically mentioned in Fabry. Thus, we find that Fabry, as explained by Hayashida, necessarily employs an aqueous oxidative cleaning solution to remove residues from a polished wafer (immediately after a wafer has been polished) before subjecting the resulting polished wafer (freed of residue) to additional oxidative cleaning steps.

² This solution is encompassed by the claimed aqueous treatment agent solution.

In any event, we find that Hayashida at least teaches removing residues or contaminants from a wafer using an oxidative cleaning solution embraced by claim 14, thus suggesting the desirability of using its oxidative cleaning solution for removing residues from the polished wafer of the type exemplified in Fabry (immediately after polishing). Moreover, we find that Lampert teaches adding an oxidizing agent either at the end of the polishing step or to the alkaline polishing agent flowing on the wafer surface. See column 1, lines 58-65.

Given the above teachings, we concur with the examiner that the applied prior art references would have at least rendered the claimed process *prima facie* obvious to one of ordinary skill in the art within the meaning of 35 U.S.C. § 103.

The appellants argue that the claimed process reduces more defects in polished wafers than those produced by one of the alternative embodiments described in Lampert (adding an oxidizing agent to an alkaline polishing agent). See the Brief, pages 16-17 and the Reply Brief, page 5. In support of this argument, the appellants refer to a Rule 132 declaration executed by Mr. Heinrich HENNHOFFER, one of the inventors listed in this application, on May 9, 2002. *Id.* It appears to be the appellants' position that this improved result is sufficient to rebut the *prima facie* case of obviousness established by the examiner. *Id.* We do not agree.

In the first place, we find that Fabry necessarily or implicitly employs an aqueous oxidative cleaning solution to remove residues from a polished wafer (immediately after

the wafer has been polished) before subjecting the resulting polished wafer to additional oxidative cleaning steps as indicated *supra*. We find that Lampert also expressly teaches employing an aqueous oxidative cleaning step after the end of a polishing step. Thus, the examiner's rejection cannot be overcome by the declaration which relies on the feature implicitly described in Fabry or readily envisaged by one of ordinary skill in the art from the written description of Lampert to show unexpected results. Compare *In re Malagari*, 499 F.2d 1297, 1302, 182 USPQ 549, 553 (CCPA 1974)(without novelty, a showing of unexpected result is irrelevant). To hold otherwise is to impart patentability for recognizing inherent results of old processes.

In the second place, the appellants have not demonstrated that the claimed invention imparts unexpected results relative to the closest prior art. *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972)("the burden of showing unexpected results rests on he who asserts them"). The declaration does not contain any averment that the allegedly improved result is unexpected. See *In re Orfeo*, 440 F.2d 439, 441, 169 USPQ 487, 489 (CCPA 1971). Nor does the declaration compare the claimed invention with the closest prior art. See *In re Baxter Travenol Labs.*, 952 F.2d 388, 392, 21 USPQ2d 1281, 1285 (Fed. Cir. 1991). We find that Fabry is the closest prior art since it, like the claimed invention, removes residues from and at the same time, applies an oxidation layer on a polished wafer immediately after polishing a wafer. We find that Lampert's one of the alternative embodiments, which is not exemplified, but can be readily

envisaged by one of ordinary skill in the art as indicated *supra*, is also closer to the claimed invention than the one compared in the declaration. See *In re Johnson*, 747 F.2d 1456, 1461, 223 USPQ 1260, 1263-64 (Fed. Cir. 1984) (Appellants are required to compare the claimed invention with more than one closest prior art if necessary).

In the third place, it cannot be ascertained from the showing in the declaration whether the improved result is due to the types of oxidation agents used, the types of oxidation conditions employed, the types of impurities or contaminants involved, the treatment times used, or the claimed polishing-oxidation sequence as alleged. See *In re Dunn*, 349 F.2d 433, 439, 146 USPQ 479, 483 (CCPA 1965) (“While we do not intend to slight the alleged improvements, we do not feel it an unreasonable burden on appellants to require comparative examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables.”). In this regard, we note that the declaration is devoid of any details as how the wafers referred to therein are actually treated. In other words, the declaration is silent with respect to the types of conditions used, the types of treating agents employed, the types of cleaning steps employed, the treatment times employed, etc.... Any of these factors could have reduced additional defects in wafers.

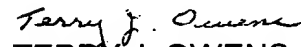
Thus, having considered all of the arguments and evidence relied upon by the examiner and the appellants, we determine that the evidence of obviousness, on balance, outweighs the evidence of nonobviousness proffered by the appellants. Hence, we concur

with the examiner that the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art in view of the applied prior art references. Accordingly, we affirm the examiner's decision rejecting the claims on appeal under 35 U.S.C. § 103.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


CHUNG K. PAK
Administrative Patent Judge


TERRY J. OWENS
Administrative Patent Judge


JEFFREY T. SMITH
Administrative Patent Judge

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Appeal No. 2005-1086
Application No. 09/032,305

Page 9

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